DOCUMENT RESUME

ED 238 789 SO 015 327

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TITLE Origins of the Sexual Division of Labor.
PUB DATE 83
NOTE 29p.; In: Women's Nature: Rationalizations of Inequality. New York, Pergamon Press, Inc., 1983. p123-147.
PUB TYPE Viewpoints (120)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Biological Influences; Evolution; *Females; Labor Force; *Labor Utilization; *Males; Models; *Physical Characteristics; *Sex Differences; Sex Discrimination; Socialization; Social Science Research
IDENTIFIERS *Division of Labor

ABSTRACT

An interactive, biosocial model of early hominids presents evidence that physical sex differences are not the basis for the sexual division of labor as is commonly believed. Production (the deliberate collection and distribution of food) developed among early hominids as a prerequisite for survival. Although the population appears to have had marked physical sex differences, production activities were pursued equally and in similar fashion by all able-bodied individuals regardless of sex or age. Divisions of labor occurred only when immediate situations or individual circumstances demanded. With developments in technologies of food acquisition and processing and changes in diet, individuals needed to learn different skills to perform the more complex tasks, and skills became differentiated by sex. Now, long before the appearance of reproductive sex differences, children get sorted and socialized for the tasks they will perform as adult men and women. A fundamental conclusion of this model is that the subordination of women did not accompany the appearance of a sexual division of labor and thus is not something basic to the human condition. (LP)

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Figure X. Tongan Woman Painting Ngatu, a stenciled and decorated form of Bark Cloth. Photograph by Peter Carmichael, courtesy of William Collins Publishers, London and Christine Ward Gailey.

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Origins of the Sexual Division of Labor*

LILA LEIBOWITZ

Lila Leibowitz proposes an interactive, biosocial model for the origins of the division of labor by sex. She presents evidence that early hominids did their work in ways that were not sex-specific. With changes in diet and in the technologies of food acquisition and processing, individuals needed to learn different skills in order to perform the more complex tasks, and skills became differentiated by sex. Now children get sorted long before reproductive sex differences make their appearance and are socialized for the tasks they will perform as adult women and men. In this model, technological, social, and biological developments go together, and there is no point asking simplistic questions about which comes first. A fundamental conclusion of the model is that the subordination of women did not accompany the appearance of a sexual division of labor and thus is not something basic to the human condition.

INTRODUCTION

The "common sense" explanation of the division of labor by sex that is usually offered is that it is related to differences in size and strength between early, proto-human women and men and to the lengthened "biological" dependency of the young. This implies that the sexual division of labor is protocultural and, therefore, "natural." But this notion does not bear up under close inspection. In this article I will try to show that early hominids of both sexes, despite their differences in size after reaching sexual maturity, engaged in the same kinds of productive activities. Adult females just combined these activities with bearing and nursing the young.

The explanation of the sexual division of labor offered here is built around three main points. They are as follows: 1. The quintessential human adaptation is the invention of and reliance on production. The elaboration of productive processes, followed by the differentiation of various kinds of productive activities, are preconditions for organizing production. A regular sexual division of labor thus was unnecessary as long as production was unspecialized and undifferentiated. 2. With the

*I would like to express my gratitude to Nathaniel Raymond, Ruth Hubbard, Alan Klein, Ellice Gonzalez, Carolyn Fluehr-Lobban, Stephanie Coontz, and Peta Henderson for reading and commenting on an earlier draft of this chapter.

emergence of technological innovations which led to the development of a number of different productive processes, divisions of labor became practicable. While the division of tasks along sex lines was influenced by the different reproductive functions of women and men, the division of labor itself was a social construct that arose out of new techniques of production. 3. Firm rules and the institutionalization of a sexual division of labor arose in conjunction with the regularization and expansion of Exchange between groups. (I will use "Exchange" with a capital "E" to refer to moving goods between groups, and "exchange" with a lower case "e" to refer to what took place within groups.) The expansion of Exchange was made possible by the new technology and was regularized by incest prohibitions, contractual marriages, kinship designations, and family arrangements, all of which are linked to the establishment of formal rules for the sexual division of labor. All are the products of cultural processes. None are part of our "natural" legacy.

The evidence I use to support this explanation is necessarily indirect. Two major pieces of that evidence come from biology. The first has to do with the fact that whereas early hominid males and females who were sexually mature were markedly different physically (e.g., sexually dimorphic), life expectancies were short. Sexually reproducing, physically differentiated adults rarely survived for any length of time. Consequently many foragers were young and physically undifferentiated by sex.

The second biological datum has to do with the fact that the size differences between females and males diminished recently and rapidly. After eons during which the size difference between females and males was marked, this sex difference was reduced during the period when fire and projectile hunting techniques became widespread. Since dimorphic and nondimorphic species have different mating patterns, this physical change seems to indicate that mating patterns were transformed as production became complex. Evidently Exchange assumed great importance at this time and marriage contracts and kinship systems became vehicles of political and economic transactions. "Family" became part of the social landscape and the sexual division of labor was institutionalized.

I deal only generally with the archeological evidence that testifies to the simplicity of early foraging techniques and make little mention of sites used by early humans which have been interpreted by the archeologists Glynn Isaac as "home bases." These sites have been characterized as places where females and dependent youngsters spent much of their time while adult males foraged. Richard Potts has analysed the detritus at such sites and the length of time they were used (five years or so).(1) Comparing that detritus with what is found at the temporary campsites of contemporary foragers, he concludes that the sites were not "home bases" but may have been "safe" places to which game was brought again and again by groups of foragers. The foragers ate the meat raw and scavengers consumed what they left, a very different pattern than that found at recent sites. Potts argues that

genuine, human home bases were not likely to have evolved prior to the controlled use of fire and suggests that the notion of a "home base" has become entrenched in human evolutionary theory only because the idea of home or community is central to modern life.

THE BASIC DATA

Most people assume that the sexual division of labor is derived directly from biological differences between the sexes that are expressed in sexual dimorphism, even though the cross-cultural and anthropological data indicate otherwise. Let us briefly look at this evidence.

All human societies today have some sort of division of labor along sex lines; that is to say, all of them have arranged matters so that there are some tasks men are supposed to perform regularly, and others that fall into the category of women's work. Societies differ a good deal, however, with respect to how labor is divided between the sexes. Nearly any anthropology text offers up a list of societies in which Western notions of what women and men are supposed to do are overturned. What actually happens "on the job" and in daily living adds further variety. There are societies where anyone, regardless of sex, is expected to do almost, but not quite, everything that needs to be done, at times alongside members of the other sex, at times segregated from them. There are also cultures where nearly every conceivable task has been designated as either women's work or men's work. How strict such designations are also differs by time and place. Under different circumstances, a man who performs what a society designates as women's work may attract no attention at all, may be subtly ostracized or openly punished for his actions, or may be honored in one way or another. Much the same difference in responses to women who pursue men's activities is documented in the anthropological literature. That cultures differ greatly in how much they separate what women and men do, and how strictly they observe and maintain these distinctions is not as well recognized as the fact that women's work in one society is often men's work in another.

W , then, do people in general and many scientists still regard the sexual division of labor as directly derived from biological differences?

Despite all the variability the fact remains that all known human societies have some sort of division of labor along sex lines. Furthermore, the biological differences between women and men are universally recognized and recognizable. Though physical differences between human females and males are not as marked as they are in some other primate species, and although one can find women who are taller, hairier, or more muscular than some men in their own population and than all men in some other population, humans are nevertheless members of a sexually dimorphic species. This "universality" of biological sex differences plays a part in how the origin of the "universal" division of labor by sex is viewed. Some theories hold that the physical differences between women and men provide the basic

reasons for dividing productive work. Others regard these physical differences as merely a set of conditions which were taken into account when the techno-cultural innovations that encouraged a division of work roles emerged, when the advantages of dividing labor were recognized, and when the habit of dividing labor by sex was institutionalized.

THE TWO BASIC MODELS

Theorists who have built models of early human situations agree on at least one point. All assert that underlying any division of labor is the concept – or practice – of exchanging goods,(2) and underlying any exchange of goods is "production." Production implies that individuals actively get or make a good in greater amounts than they plan or are able to use in order to provide others with that good.(3) They agree that "exchange" is any situation in which people who do or make certain things provide others with a good, and the others reciprocate either by returning the same good at another time or by returning some other good immediately or later. However, the models they build differ regarding how "production" arose. Two basic models of the origin of production are discernible.

Biodeterminists argue that exchange arose because the biological differences between females and males result in different natural propensities or different activity profiles. As a consequence, the sexes produce different things. Typically, the model says that women (as well as primate and hominid females), because of their physical characteristics or their "natural" or normal involvement with pregnancy, nursing, and/or care of the young, were inclined and ultimately required to refrain from certain subsistence activities, usually collecting game.(4) Men's biological traits, on the other hand, encouraged them to pursue these activities and the game. Men brought in meat, and women brought in vegetable foods. The outcome of the "natural" sex-differentiated subsistence activities resulted in the existence of producers who produced different products. This situation then generated the need to exchange products. In biodeterminist models, the habit of exchange emerged because of differences in products, and the sexual division of labor existed prior to the emergence of Exchange.

Many Marxists, as well as other sociologically-oriented theorists, suggest explicitly or (more often) implicitly, a somewhat different sequence of events. They indicate that both production and Exchange must have been in place well before a formalized division of tasks or products along sex lines. The variability of incest rules that regulate mate Exchanges and the variability of rules governing the way labor is divided in recent human societies leads them to conclude that the bases of such rules are social and cultural. Their analyses result in a model in which the sexual division of labor, incest taboos, marriage, kinship and kin groups all emerged to cement alliances and to sustain intergroup Exchanges of products and people. Sociological models, therefore, suggest that sex-undifferentiated production and a distribution of

products preceded within-group exchange, and that Exchanges of some sort between groups preceded the invention of the sexual division of labor and of sex-differentiated production or products.(5)

The sequence of events sociological analyses implicitly postulate is roughly as follows. First, the habit of production appeared; that is, individuals, both female and male, pursuing similar or identical subsistence activities began distributing to those around them what they did not themselves consume and began consuming what others had produced. Reliance on each other led them to produce goods deliberately for distribution and to engage in what anthropologists call generalized reciprocity. Later, when and if people moved or production exceeded local needs, intergroup Exchange occurred if the opportunity offered itself. I will argue that as it became advantageous to Exchange products, skills, or personnel, a sexual division of labor was institutionalized along with incest rules and marriage rules to maximize those advantages, and as a consequence, within group exchange was regularized.

From a sociological perspective, a satisfactory biosocial model of the evolution of the sexual division of labor should begin by explaining the ways in which evolving hominids of both sexes became producers rather than self-feeders; then it should show the ways in which exchanges (or Exchanges) of products and/or of people arose; and only in its last phase need the model deal with the origins of the sexual division of labor. I have not yet seen such a model.

SHARING AND PRODUCTION

The two most familiar explanations of why and how production came about do not deal directly with the concept of production but focus instead on sharing, and do so in a manner that I consider biodeterminist. The discovery that sharing is practiced by some chimpanzees and baboons, who take game and either give out pieces of meat or eat side by side on a carcass, is the basis of one such explanation. Primate hunting, though it occurs only in a few settings, is cited as the kind of protohominid behavior that must have given rise to production for distribution and exchange. The way these primates forage for game is tied to the sexual division of labor on the grounds that male baboons and chimpanzees take game more frequently than females do and expend more time and energy on taking game.(6) Yet the data in fact show that chimps or baboons who take game – whether female or male – do not spend much time on this activity and don't get to eat much meat. In other words, game collecting and meat eating are rare and meat sharing is even rarer.(7)

Viewing meat sharing as the basis for production seems questionable on several grounds. For one thing, social predators far from the primate line, and whom no one implicates in "production," often share meat in a social setting. Lionesses and wolves even bring game back to their young, which is more like "production" than anything chimps or baboons

have been seen to do. Furthermore, the basic staples of primate foragers, human and nonhuman, are plant foods. Among nonhuman primates, those that forage side by side rarely share the fruits or roots they collect. Nevertheless individuals of both sexes have been seen to share such vegetable foods in response to gestures of request,(8) and nursing mothers have been seen to give bits of vegetable foods to their infants.(9) The notion that production for exchange derives from the habit of sharing meat is based on confusing a sustenance behavior found among many predators with a human activity that is qualitatively different and exaggerates the role of males as providers of meat. Some versions of this male-centered "sharing" model argue that the most successful male hunters are also the most successful impregnators who spread their "hunting genes" around as they give out game. This notion is not borne out by the data regarding sexual activities among hunting chimps or baboons.(10)

A less popular, feminist rather than masculinist, biodeterminist version of the origins of production for exchange and of the sexual division of labor credits plant-collecting females with inventing "sharing."(11) This explanation of the origins of the human "habit" of production states that mothers (e.g., females) began to share by giving their infants food, then began to gather enough food to give some to their older children (inventing carrying devices in order to bring back enough plants for them), and eventually began giving some of what they had gleaned to males in exchange for the meat the males had collected. Aside from the fact that primate males have been observed sharing vegetables as well as meat,(12) this model, which calls for the transformation of maternal generosity and sharing into production for distribution raises some practical questions: Why didn't males gather whatever vegetable foods they needed while they were out hunting, as they do routinely in foraging societies? Why didn't mothers systematically collect small game, as they do among the Tiwi, and skip the exchange with men entirely, as they do among the Hadza?

In essence, both kinds of biodeterminist models assume sharing as the basis of production. They develop out of the notion that sex differences in activities somehow existed as soon as our primate or proto-human ancestors began going after game and resulted in an intrinsic sexual division of products. Production is confused with sharing, and sharing becomes the province of one or the other sex. Both models stem from the view that physical differences dictate sex differences in behavioral and productive capabilities. However, the data do not support this generalization. Production, as we shall see, seems to have arisen under circumstances in which sex differences were of secondary importance. Among primates, sexual dimorphism does not mandate different tasks for females and males, though it permits males and females to engage in the same activities in slightly different settings, thus minimizing competition for resources.

DIMORPHISM AND WHAT IT TELLS US

It is relevant to this discussion that while there is a good deal of debate about how to classify early hominid remains and whether all of them belong to a single species, there is an emerging consensus that the early hominids who walked on two legs were not only small – adults were only 3½ to 5 feet in height – but that they also exhibited marked sex differences in size.(13) By the time Homo erectus types appeared, the height of members of the line leading to Homo sapiens had increased. A strong size dimorphism is still found in early Homo erectus populations. Male-female size differences diminish only in late Homo erectus populations. For two million years, sexual dimorphism in height remained marked while hominids became taller.(14)

Despite many claims to the contrary, the presence of physical sex differences tells us little about social patterns. Size differences between the sexes among living terrestrial and semiterrestrial primates do not, in fact, correlate with any particular form of social organization and do not correlate with pairing arrangements.

Dimorphic primates live largely terrestrial or semiterrestrial lives. Species in which males are larger and have bigger teeth than females exhibit a variety of social organizations. Chimpanzees live in large amorphous and variously organized populations.(15) Baboons live in a variety of settings, such as forests and savannahs(16) and exhibit different patterns of social organization in the different places.(17) Groups of Patas monkeys include females who tolerate one or two males, while among hamadryas baboon groups a male may be found "herding" females.(18) Among orangutans, where dimorphism is extreme, each female with her young occupies a range. Males are "loners" and usually travel widely over several such ranges. Yet orangs raised in captivity and returned to "the wild" become social, aggregating, tool-using apes.(19) In Sumatra, where small siamangs chase male orangs from food, these orangs ally themselves peacefully with a female for a while. In Borneo, where logging operations are displacing orang populations, lone males attack and "rape" females.(20) Even parenting is variable. In some troops of Barbary Apes (who are actually monkeys), males have been observed carrying and caring for infants, while in other troops this has not been seen to occur.(21) Male Rhesus monkeys are rarely involved with infants in the wild, but turn out to be capable of concerned parenting in laboratory settings.(22) Behaviors vary, but among all these primates provisioning others is not tied in with dimorphism. Individuals generally rely on feeding themselves. A sexual "division of labor" simply does not occur. In dimorphic species, in which different populations or groups do different things, it is eminently clear that the behavior is malleable, adaptable, and learned, and that the particular social form it takes is shaped by circumstances and experience. The "fact" of sexual dimorphism among early hominids by itself cannot, therefore, be translated into conclusions about specific forms of social organization. Clearly many types of organization are possible, as they are among other dimorphic primates, and many have occurred.

Does the occurrence of sexual dimorphism have anything to tell us about the social interactions of primates? The answer appears to be that it does. Despite the variability of the social arrangements among sexually dimorphic terrestrial primates, several biological and behavioral conditions that are characteristic of all of them suggest an explanation. First, in all these species dimorphism becomes marked only at puberty, when males continue to grow and females usually become pregnant and slow down or stop growing. Secondly, this dimorphism occurs in conjunction with a reproductive cycle that makes adult females rarely available for insemination; females who are pregnant for many months and nurse for several years are out of the mating pool for long periods of time. Thirdly, the adult males usually range more actively and widely than do encumbered adult females. (This sex-difference in the size of ranging areas is not characteristic of nondimorphic arboreal primate species.)(23) These three conditions create a pattern of circumstances that leads to the differential distribution of mating opportunities among males.

The outlines of the pattern are the following. Females become pregnant for the first time soon after puberty, stop growing, and experience a decline in activity levels. From then on, there are long intervals between successive fertile periods. The activity levels of males are usually very high during their adolescent growth spurt and for a while thereafter. As the males become larger and otherwise differentiated from females, the males' food needs are quite high. Particularly in terrestrial settings, growing males tend to find themselves competing for food with other animals, especially with females who are pregnant or nursing and also eating for growth, though not their own growth. Healthy, growing, active males who are experiencing a growth spurt usually wander widely, presumably at least in part to satisfy their hunger. (In some places, where adolescent males move away from the group, they begin to find foods females rarely eat.) If a male who wanders widely grows big, avoids or intimidates predators, and survives, he is obviously in a position to bump into a female (or two or three) who is in one of her infrequent fertile periods. A male who is not as active and/or fails to survive the trip obviously has fewer mating opportunities. The hungry, growing, active male is more likely to father an infant (who, if male, may inherit a tendency toward the same growth pattern) than his less fortunate peers. As he ages, his activity levels decline, and his mobility may be reduced. Nevertheless, the longer he lives the more infants he will have a chance to father. Obviously, more mating opportunities are open to large males who are spurred to wander and manage to survive their wanderings than to smaller males. (The fact that a male's growth and maturation rate affect his reproductive success is documented in a dimorphic species of deer in the only study to date that clearly identifies each newborn's biological father).(24)

By contrast, all the females have the same kinds of mating opportunities, even though those who tend to be smaller apparently have a long-term reproductive advantage over larger females. (Data

that will be reviewed below indicates that where the quality or quantity of food is a problem, females with lighter nutritional needs come to sexual maturity earlier, are in better health, and have more and healthier babies than their sisters.) Whatever the adult size of a female, she inevitably can find mates, often "transient" ones, during her rare fertile periods.

Evidently, a major size difference between the sexes of a terrestrial primate species tells us only one thing about its social interactions: that the females who survive to maturity have similar mating opportunities, whereas among males, mating opportunities vary in that active males who tend also to be bigger have a reproductive advantage over other males. Having big males serves the species well. It allows the males, who are engaging in the same kind of food-getting activities as the females to get more food by "going abroad" for it. This removes some of the foraging pressures on females.

A RECONSIDERATION OF GROWING UP HOMINID

Sex differences in size tell us little about early hominid social organization. Does the evolutionary fact of an overall increase in size among early hominids indicate anything about changes in hominid social arrangements?

It is commonly (and incorrectly) believed that the larger the size of a primate species, the longer it takes for the members of the species to mature sexually, and the longer the young are in a state of dependency. From this we might be tempted to conclude that the increase in size of hominids indicates that the maturation period of hominid youngsters grew longer and longer by degrees as one generation replaced another. Such a conclusion is unwarranted.

Leakey's and Prost's casual observations on Zinjanthropus,(25) as well as Mann's systematic analysis of the extensive Swartkrans fossils(26) indicate that some early hominids (Australopithecines) matured at a rate closer to that of present-day human populations than to that of present-day large primates. Early hominids took about as long to reach sexual maturity as we do. Among our sexually dimorphic ancestors, the small females, Mann estimates, became sexually mature around the age of twelve (and pregnant presumably shortly thereafter) if conditions were right.

Startlingly, Mann's analysis of over three hundred fossil specimens leads him to the conclusion that the average age of death among Australopithecines was also around twelve, though McKinley's analysis of the data suggests an average life span of about twenty years.(27) Despite the different life expectancy figures, which reflect different estimates of infant mortality rates, a similar population structure is suggested by both analyses. Assuming, as both Mann and McKinley do, a somewhat shorter birth interval than the four to five year spacing found among present-day chimpanzees, a female who had a first infant around twelve, had another at about age fifteen, and another about three years

later, and so on. Like the males of her generation, who perhaps fathered one or another of her offspring, she probably died before all her young were sexually mature. A few individuals of both sexes presumably lived into their thirties. What can we conclude from this?

It is all too easy to interpret the population profile that emerges from this pattern of late sexual maturation, early death, and high mortality rates as one overflowing with orphaned youngsters, handicapped by the loss of their mothers. Let us brush aside our biases about the dependency of human children and our preconceptions about the skills and information they must acquire before they become fully functional adults and look again.

Given what we know about dimorphic primates, savannah groups of these early hominids would have been constituted of a small number of fully adult large males (who presumably circulated widely between groups), a similarly small number of infrequently fertile adult females (most or all of them with infants and small youngsters), and a rather large number of "orphaned" females and males at different stages of prereproductive physical development. Individuals who were orphaned while young and prereproductive had to forage for themselves or cooperatively to survive. The situation resembles one that has been observed in a population of vervet monkeys, where it was found that throughout the period of study, mortality was high and the birthrate low in three groups. "Family size [sic] was small and there was a large number of orphans. . . . All of the animals spent the greatest proportion of their days feeding and foraging."(28)

Among the early hominids, presumably the physically similar males and females were able to forage in much the same ways. Since hominids have survived, we must assume that many of the orphaned youngsters succeeded in surviving to a reproductive age – that is, to 12 years or older. Only then did the females become less wide ranging by virtue of pregnancy and the encumbrances of infants. Only then did some of the males become large and likely to move about more widely than within the confines of a group.

Both males and females had by age 12 experienced a long learning period in a group large enough to insure their safety. For some, neither parent had been around for a long time. Before reaching maturity many must have been called upon to forage for themselves. If, in fact, an individual's mother lived long enough to produce a half or full sibling, mother's attention probably was diverted to the new infant. Under such circumstances she was as likely to benefit from what the young forager found as the other way round, a situation that Tanner envisions in her model of early gathering societies.(29)

A division of labor is present if those who are encumbered or incapacitated are treated as nonproducing consumers. Such a division of labor may well anticipate dividing labor in other ways, such as, along lines that generate differentiated products. Tanner notes that, "The common assumption that it [a division of labor] was primarily or exclusively by sex is, however, an oversimplification."(30) The character of the age distribution data in early population suggests that

dimorphism played an insignificant role in differentiating foraging activities by sex. It also suggests that maximum cooperation (generalized reciprocity) was important for survival.

It can be inferred from another set of biological data (see below) that first pregnancies probably did not occur immediately after puberty, that adult females had only a few successful pregnancies, that births were more widely spaced than Mann and Markley propose, and that the survival of an infant or youngster depended on the cooperation among group members.

Frisch's recent researches on body fat, puberty, and fertility in modern human populations indicate that three factors influence human fertility: the amount of food individuals get, the kinds of food they eat, and the amount of physical activity in which they engage.(31) Modern human populations differ from other primate populations not only in their furlessness, but in the fact that though men and women are not very different in size, women, unlike other primate females, develop permanent deposits of breast and buttock fat upon becoming adult. Let us deal with Frisch's data on females first.

Frisch found that the age at which puberty occurs and the maintenance of a regular menstrual cycle are correlated with the proportion of a woman's body weight that is invested in fat. Undernutrition slows body growth, delays the time at which puberty occurs, and reduces fertility in females. Starving women stop menstruating. Underweight, malnourished and (surprisingly) obese women become amenorrheic; that is, they do not menstruate. How much and what is eaten as well as levels of physical activity together determine how much fat a woman carries. Very active women on a poor or marginal diet stop menstruating; on a healthy but marginally weight-sustaining diet they do not menstruate while nursing infants. The birth weight of an infant is correlated with the pregnancy weight of its mother, and an infant's survival is correlated with its birth weight. Consequently, an ill-fed, very active woman has few healthy children.

In males "severe undernutrition results in loss of libido, a decrease in prostate fluid, a decrease in sperm motility and longevity, and, eventually, the cessation of sperm production, in that order. Undernutrition . . . delays the onset of sexual maturation in boys."(32) Furthermore, high rates of sexual activity reduce sperm counts (something men who are "sexual athletes" may or may not realize). In addition, aging has a deleterious effect on quality as well as quantity of sperm. Finally, and far from unimportant with respect to early hominids, Frisch notes that experimental evidence drawn from laboratory animals indicates that substituting fat calories for carbohydrate calories hastens fat deposition and sexual maturation in males as well as in females. Frisch's data are relevant here and will also be significant in the analysis of later events.

Now, let us return to our populations of early hominids. The archeological evidence indicates that some of them were taking small game (thus adding animal proteins and fats to their diet) and making simple tools somewhere between 2.9 and 2.7 million years ago.(33) What

helped these predominantly youthful populations to survive, reproduce, and achieve the slow but steady increase and dispersal that characterizes the early hominid evolutionary grade? What allowed individuals of either sex to leave a genetic legacy in a population with a high mortality rate among the young, a "late" age of sexual maturation, infrequent mating opportunities, rare successful pregnancies, and a low birth rate? How were populations so at risk of extinction able to survive, replace members, and eventually expand their numbers? Apparently by inventing "production."

"PRODUCTION" FOR SURVIVAL

Many of the important actors in the scenario I see emerging from this configuration of circumstances are the females and males between about 4 and 12 years old. They were feeding themselves, but not yet sexually mature. While their range of sizes reflected the age differences among them, males and females of the same age were similar in size and body form, though adults were dimorphic. Remains in ancient sites and evidence from contemporary human foragers and other primate groups suggest that these males and females engaged in several kinds of foraging activities. Such activities at present rarely involve distinctions between what females and males (or young or old) are called upon to do. They include: 1. individual foraging for small game and vegetables; 2. group hunting (of either the surround or drive type or of the "chase and exhaust" variety) focusing on small animals; and 3. killing or scavenging large animals that are, somehow, incapacitated. These foraging activities could have been accomplished with simple tools by young foragers and by adults. (At present, adult females as well as males are known to participate in these kinds of activities.) Such individual or cooperative activities – undifferentiated along sex lines – become production whenever more is acquired than can be consumed "on the spot" and the surplus is distributed for later consumption. Production proved to be advantageous for all the actors in the scenario.

Here is how recent biodeterminist evolutionary models of behavior might explain an "instinct" for production and exchange. The survival values of production and of giving away goods without expecting an equal or immediate return for them (a form of Exchange called "generalized reciprocity") can be looked at as "genetically selfish" and a result of "kin selection." In sociobiological terms, individuals are geared toward maximizing their genetic legacy. Achieving sexual maturation as early as possible and in good health is, therefore, an "advantage" sought by the individual. Diversifying food supplies and getting as much meat to eat as possible would help achieve this advantage. Both are easier for the individual to accomplish if she or he belongs to a wide ranging, cooperating group. Presumably the individual should strive to assure him/herself that an opposite sexed individual also survives to sexual maturity. Provisioning peers of the other sex is therefore

worthwhile. Provisioning same-sexed peers is also worthwhile, not only because of the rewards of reciprocity, but because the chances are high that among those same sexed peers are half siblings or "cousins" who carry some of the individual's genes. Helping feed one's own mother or caring for any of her other offspring would serve to enhance the chances of some of one's genes surviving, though one may never reach sexual maturity. Provisioning older adults, whatever their sex or relationship, pays off in another way, too. The older, more experienced members of the community are the repositories of nongenetically transmitted information useful for one's own survival. While helping each other stay alive and eat well is particularly important for orphans "trying" to reach a reproductive age, anyone who helps another is bound to maximize the chances of his/her genes surviving, and since the populations are so small, everybody is more or less related to everybody else.

While the above "explanation" makes it clear that production increased the survival chances of early hominids, it does not validate the view that "genes for production" became prevalent because of kin selection. For one thing, kin selection is irrelevant in small populations in which all or most are kin. For another, discriminating between degrees of relatedness in distributing largesse would seriously jeopardize the survival of a species barely able to replace its members. For yet another, nonkin based reciprocity rather than what is called kin-selection is evident elsewhere among animal species.(34)

To sum up, then, it appears that undifferentiated "production," or "provisioning others," or "generalized reciprocity" – or whatever one wants to call it – must have played a part in maintaining the small, youthful populations of early hominids whose marginal replacement rates kept the species hovering precariously on the edge of extinction. Inventing production evidently improved their ability to survive and even permitted a very gradual increase in numbers. The slow rates of population growth and dispersal of hominid populations indicate that replacement rates remained essentially unchanged for eons.

THE EMERGENCE OF EXCHANGE BETWEEN GROUPS

The functions and effects of dividing labor and of Exchanging as well as exchanging products have received enormous attention ever since the Enlightenment and will not be examined here. The model being explored here departs from commonly held views about the origins of exchange primarily in seeing Exchange between groups as an economic arrangement that emerged before the sexual division of labor was institutionalized and that standardized exchange within groups. Sociological analyses of the often arbitrary ways in which tasks are divided along sex lines usually point to the part played by the sexual division of labor in helping cement the bonds of Exchange networks.(35) Whereas Durkheim clearly says that the sexual division of labor emerged as an instrument for cementing intergroup bonds,(36) few other sociologists

are so explicit. The notion that the practice of the sexes exchanging goods within groups was a precursor of a sexual division of labor, and one of the conditions that led to regularizing it, is either implicit or (as is evident in Parsons' works(37)) absent. Two lines of evidence suggest that Durkheim was correct, and that Exchange arose before the sexes were committed to exchange.

The cultural evidence suggests, that in the populations we have been discussing, males and females gathered food in the same ways during the period in which subgroups of the population began Exchanging goods. The artifacts and food detritus associated with early human groups show little change for nearly two and a half million years. These remains reflect the use of foraging techniques that are simple, involve both sexes, and call for similar activities on the part of both. The cultural evidence, therefore, indicates that the foraging activities of female and male producers remained undifferentiated for a long time.

Though foraging patterns apparently did not change much for two and a half million years, a gradual increase in the population took place as evidenced by its dispersal over an ever-widening area. Ranging more widely and producing and distributing diverse foods probably helped increase survival rates, but the extreme slowness of the rate of population growth in the face of a somewhat improved diet indicates that reproductive rates remained low. According to Frisch's analysis, maintaining high activity levels acts as a brake on female fecundity. Data supporting her analysis shows that women who lead sedentary lives become pregnant more quickly, give birth more often, and have more children than women who are highly mobile and engage in strenuous activities.(38) A low reproductive rate consequently supports the idea that during the time that foraging tools and techniques remained essentially simple, women's activities remained strenuous, and women, like men, spent little time at the so-called home base sites of this period. The maintenance of marked sexual dimorphism in the populations indicates further that no change took place in the way mating opportunities were distributed among males. There are, then, several reasons for concluding that foraging activities were not differentiated along sex lines and that mating arrangements remained essentially amorphous during a period in which intergroup Exchange (as evidenced by finds of rocks and food remains at places distant from their sites of origin) emerged as an opportunistic practice.

How and why did intergroup Exchange emerge? Dispersal and local specializations in technology and in the food products that became more diverse must have set the stage for intergroup Exchange. The wider dispersion of the slowly enlarging populations resulted in localized groups, loosely articulated to each other, with different resources, and skills that were perhaps becoming differentiated. The exchange of products differing from one locality to another, or of products that are temporarily scarce in one area probably emerged as an extension of productive patterns. It seems clear, therefore, that the habit of Exchanging products arose before female and male products and production activities had become differentiated.

THE INSTITUTIONALIZATION OF THE SEXUAL DIVISION OF LABOR AND THE EXCHANGE OF SEX-DIFFERENTIATED PRODUCTS

The reasons I believe that a sexual division of labor, along with incest taboos and marriage Exchanges, appeared late – that is, well into Homo erectus times – is based on three lines of evidence. The first involves the appearance of fire hearths and fire-hardened spears, followed by stone tipped spears, atl atls, and bows and arrows. Let us reconstruct the consequences of this transformation in hunting technologies.

Projectile hunting created new conditions. It permitted a major increase in the amount of meat in the diet of what soon became a rapidly proliferating and quickly spreading human population. Innovations made it possible for hunters to shift from an early concentration on taking a few middle-sized and larger herd animals, to taking more middle-sized and smaller animals with solitary habits.(39) How game was pursued changed. Injuring or killing game from a distance calls for sustained quiet as the pursuer stalks an animal. One or a few individuals can bring in good-sized animals to feed a number of others. Furthermore, projectile hunting tools can be used as defensive weapons against cornered game and predators, making it safer to hunt alone or in small groups. The hunters themselves had to change. The techniques of projectile weapon hunting demanded both training and self-control. Earlier technologies had called upon large groups of unskilled individuals of all ages to help with surrounds, drives, or chases; the participants saw much action, and it was useful if they made a lot of noise. By contrast, projectile hunting calls for silence and stealth and demands skill, experience, patience, and strength. These tend to be attributes of older individuals. Projectile weaponry would seem to have changed the character of the hunt in a way that transformed children or youngsters from active participants into dependents. In populations that were living longer, the youngsters' roles as primary producers declined.

Another consequence of the introduction of projectile weapon hunting was the elaboration of processing technologies that were fire and hearth centered. Thick skinned, medium-sized game posed problems. Preparing and cooking the products of the chase became time consuming. Other new activities emerged that required skill and experience: processing skins and hides, converting them into clothing and carrying devices, and making hunting equipment and the tools to process food and hides. Setting up and maintaining the shelters cum workshops where all of these activities took place were even more demanding. The new skills and techniques needed for the hearth bound activities required training and experience. Consequently, the time it took to become a fully productive participant in progressively more elaborate social activities expanded. The young became "dependent" on fully productive adults for the first time. The invention of projectile hunting weapons and the control of fire established the underlying conditions for dividing labor by sex and by age.

The complexity of these tasks was a significant factor in dividing labor and broadening the scope of the generalized reciprocity obtaining

within camps or groups. Not only did this complexity call for the teaching of skills to youngsters, it put a premium on making sure that the skills and knowledge of the disabled or elderly were not lost. The aged and incapacitated, whether or not they were able to undertake hearth tasks, became indirect producers by virtue of being repositories of information. The new techniques created distinctions between the activities of the young and unskilled, the adults who could venture forth and bring back necessary supplies, and the knowledgeable elderly or incapacitated members of the community who could perform hearth bound processing tasks and the socially important job of transmitting information. While a division of labor along sex lines was ultimately an outcome of the complexity of the new technology, the initial effects of this complexity must have been to encourage dividing tasks by ability and age.

The diversity of environments that human populations came to occupy by the Upper Paleolithic indicates that foraging and processing tasks differed from place to place in technical content and social form. Hearth-oriented tasks and fire itself must have differed in importance for groups and communities scattered across the Eurasian and African landmasses. Surely Siberian foragers who hunted mammoth relied in different ways on fire and developed a different repertoire of hearth tasks than African foragers in the warmer climates who had a richer and more varied flora and fauna to exploit. With the emergence of Mesolithic technologies in communities that exploited the resources of shores, lakes, rivers, and seas, even greater variability of foraging and processing tasks – and the way they were organized – must have developed. Which tasks were assigned to what class of persons undoubtedly depended in part on local circumstances and in part on local traditions. Whatever the way the division of labor was institutionalized, the need for dividing tasks ultimately derived from the emergence of new foraging techniques and strategies and from the new processing problems that arose from them.

The observed population growth provides the second line of evidence that suggests that the emergence of a sexual division of labor is related to the appearance of this complex of social and technological innovations. The increase in consumption of meat and animal fats apparently contributed to a marked increase in female fertility as well as to increased longevity. But the increase in the birth and survival rates in addition seems to reflect a behavioral change. It is obvious that those adults who did not go out on a stalking type hunt must have assumed the responsibility for performing hearth-centered tasks and for overseeing the activities of the "dependent" youngsters excluded from the hunt. Women with nursing infants presumably were nonhunters for variable lengths of time. Perhaps very pregnant women joined them. Engaging in time-consuming, hearth-centered activities involves a degree of "sedentism." Sedentism is associated with increased female fertility and with higher birth and infant survival rates. The population increase may, therefore, reflect a change in women's activities. The increase suggests that women in earlier settings, which were not complex enough

to generate a sexual division of labor, were not as hearth bound or sedentary as the women in those later cultures where sophisticated forms of projectile hunting were practiced. In the latter cultures, people probably engaged in a "casual" or circumstantial division of labor that to some extent followed sex lines.

The third line of evidence that suggests that the sexual division of labor was institutionalized as projectile hunting developed and hearth activities became complex has to do with the decrease in sexual dimorphism. The size differences between the sexes are large in the Early Upper Paleolithic, but approximate the smaller modern differences by the Mesolithic. This change suggests that in the latter period small males for some reason were getting a chance to mate that they had not enjoyed earlier. (Other analysts have argued that this decrease in size differences came about because the "safer" or more specialized hunting techniques were advantageous for smaller males.(40))

Together all three lines of evidence suggest that practices that equalized male mating opportunities accompanied rules institutionalizing the sexual division of labor which were related to the expansion of Exchange and the emergence of rules governing the choice of spouses.

How and why are reduced dimorphism and the institutionalization of the sexual division of labor linked to Exchange? A casual arrangement whereby hunters hunt and nonhunters undertake hearth tasks does not constitute an institutionalized sexual division of labor, even if the majority of nonhunters happen to be women, and most or all of those going on hunts are male. Allocating the responsibility of supervising the activities of older children to women, who are engaged in tasks that permit them to assume that responsibility, more nearly approximates the institutionalized division. Still, there is something missing. Even though mothers, occupied with new hearth skills, probably found themselves involved with their youngsters for much longer intervals than had previously been the case, hunters also assumed responsibilities toward the young. In addition to providing foods that mothers and children normally did not produce, they must have taken on the responsibility for transmitting their hunting skills to youngsters. The sexual division of labor not only designates which productive tasks men and women pursue: it allocates the responsibilities for socializing youngsters into those tasks differently to men and to women. When fully articulated, the division calls for recognizing early who will be a "mother" and who will not, for deciding which set of skills a youngster is most likely to use as an adult, and for training the youngsters accordingly. In this way, girls and boys, as well as women and men, are distinguished from each other. Girls learn their skills from women, boys from men. By the time hunting and hearth tasks had become time consuming and skill based, the activities of all males and females, young and old, were differentiated, and gender distinctions were in place. I would suggest that the institutionalization of such distinctions and of the rules insisting on their maintenance occurred for the following reasons.

One aspect of the interdependence between the sexes that emerged was the need for the exchange of the different products the sexes provided. This sort of exchange resembled the ongoing Exchange of different products between local groups, with one notable difference. Within-group exchange, based on a sexual division of labor, involved an inescapable interdependency. Intergroup Exchanges, while mutually beneficial, occurred irregularly and depended on when groups met, what products they had on hand, whether they needed each others' products, and whether those needs had been satisfied by previous Exchanges with other groups. Extending the inescapable interdependence of the sexual division of labor to intergroup relations can be accomplished by instituting incest rules that require the Exchange of mates between groups. Such incest rules call for formal rules governing the sexual division of labor, since they make it more likely that skills learned in one group will be of use in another.

The incest rules, which forbid taking mates from among "kin" or from among those who were members of the local group, called for groups to send skilled individuals of either sex away in contractual marriages and to attract mates into the group. Marriages established obligations and bonds and, if contracted for a long term, stabilized Exchange relationships. Marriages also made it possible to establish and maintain loose and far-flung networks of Exchange ties. The invention of incest taboos and marriage created a situation in which every or nearly every male, regardless of whether he was robust or tall or especially active at adolescence, was of potential value as a spouse if he had acquired men's skills. Similarly, a marriageable female was one who had acquired women's skills. Incest taboos and contractual marriage evidently led to the "institutionalization" of the sexual division of labor, to an equalization of male mating opportunities, and to a reduction in dimorphism as frequently monoganous unions served to stabilize and expand Exchange networks.

THE MODEL IN BRIEF: The Early Foragers

Physical sex differences between adults appear to have been quite marked in early hominid foraging populations(41). The hominids resembled other primate species in which adult males and females are physically differentiated in that their mating relationships were temporary, variable in form and content, and rarely exclusive. Foraging activities were pursued in much the same ways by members of both sexes, and there was no sexual division of labor. Adulthood appeared only after late sexual maturation (later than is characteristic of other large primates). Consequently, a large proportion of the foraging hominid population was made up of physically undifferentiated pre-adult females and males.

Sharing

The reliance on vegetable foods was nearly total at first, and, as happens among other primates with like food habits, individuals of either sex would occasionally share an item they were eating.(42) Such behavior is analogous to the sharing found among social predators and suggests that sharing was probably more usual when and where unencumbered individuals killed small animals frequently, or when they joined with others to chase and hunt small game.(43) Where taking game became a regular activity, the early hominids learned to share food regularly. Unlike social predators who also share game, these overwhelmingly youthful hominid populations had a very low reproductive rate. Populations remained small and hence risked extinction. (Populations of social predators are adequately maintained by sharing.) The development of "production," a peculiarly human social adaptation that rests on a kind of foresight not necessary for sharing, appears to have been a critical factor in hominid survival, since it made it easier for "orphaned" and incapacitated individuals to survive. Thus production contributed to sustaining a species with a low replacement rate.

Production

Production appeared when individuals or groups deliberately set out to collect goods for distribution to others. Carrying food back to "share" with others is "production." Engaging in such actions provided obvious and immediate nutritional and social rewards. The perception that "production" was worthwhile (though I doubt that its long-term survival advantages were perceived) encouraged the development of surround and drive hunting techniques that were likely to result in the capture of larger quantities of food than could be consumed on the spot.

These techniques normally called for the active participation of all able-bodied individuals irrespective of their age or sex. Many of these individuals were too young to have developed adult sex differences. Dividing labor (that is, undertaking different activities that produce different goods) presumably only occurred when immediate situations or individual circumstances called for it. Individuals, whatever their sex or physique, usually engaged in the same sorts of group or individualized foraging and hunting activities.

Exchange

The regular production and distribution of small quantities of game made animal proteins and fats dietary staples. The changed diet somewhat reduced fetal, infant and adult mortality rates, and extended life spans. The population gradually increased. Members of the sexually dimorphic species spread over an ever-widening area. Fluidly organized groups, with loose social and sexual ties to each other, became more

numerous and occupied ecologically differentiated settings. Local populations found themselves producing different products. The goods produced for local distribution were sometimes Exchanged for different goods collected elsewhere or for similar goods in short supply locally. Exchanging goods increased and diversified what was available to the local groups. Production (undifferentiated by sex) continued, and in conjunction with Exchange (involving goods differentiated by locality) altered diets. The post-pubertal life span increased. The increased longevity changed the demographic profiles of successive generations. Adult height and weight increased, and the taller and heavier populations continued to be markedly sexually dimorphic. Physical sex differences remained large over the many millennia during which foraging tools and techniques showed only slow and slight changes.

The Sexual Division of Labor and Mate Exchange

The invention and elaboration of projectile hunting tools, along with the growing use of fire, created a new and revolutionary set of conditions.(44) Following their introduction, large numbers of medium-sized game animals began to be taken regularly. Carcasses were prepared and processed in elaborate ways, and animals fats and proteins became a significant part of the diet. The accompanying population expansion is apparent in the rapidity with which groups carrying the new tool kit spread over vast areas.(45) Significantly, during this relatively recent spread of "big" game hunting, the size and skeletal difference between adult females and males first increased and then diminished to present-day levels.(46) This diminution in sexual dimorphism, occurring as it does in conjunction with the development of big game hunting (in populations that already included many adults), indicates that a radical change took place in the way the opportunities for mating were distributed. The conditions that made small females more reproductively successful than larger females, and large males more reproductively successful than smaller ones, no longer existed. The chain of circumstances leading from the invention of projectile hunting tools to the reduction of physical sex differences includes a number of links: among them the emergence of the sexual division of labor, the establishment of rules governing mating, and the creation of more stable and extended Exchange networks. The links are articulated as follows.

Projectile hunting changed the ways in which production within a local population were pursued. Projectiles made it possible for one or a few skilled individuals to supply many people with meat from good-sized animals. Inexperienced youngsters were excluded from the new kind of hunting, but continued to engage in other kinds of foraging activities. The new game needed to be processed in time-consuming and complex ways, so that fire and hearth centered skills required considerable training and experience, just as the new ways of hunting did. Consequently, it took longer for youngsters to become fully productive adults. The ongoing responsibility for supervising "dependent" youngsters, along with hearth tasks, fell to nonhunters. As fetal and infant

mortality declined, more of women's time came to be occupied with child-related tasks. The risky tasks of stalking and pursuing "big" game fell more and more often to unencumbered and skilled men. The exchange of sex differentiated products produced within a local population became common practice. This internal exchange firmly established the interdependence of the activities pursued by women and men and created the dependence of youngsters on adults of both sexes.

The exchange of products within groups mirrored many aspects of the Exchange of products between localities. The latter, however, lacked the element of ongoing interdependence generated by dividing tasks along sex lines. The sexual division of labor served as an instrument for stabilizing and extending intergroup Exchange networks when it was tied to incest rules forbidding mating within a localized group. Together these rules created systems of interdependence which forced groups to Exchange producers as well as products.

Projectiles are weapons against predators as well as efficient hunting tools. As projectile techniques and tools were refined, small hunting parties and ephemeral foraging groups became more common. Scattering the males and females (of whatever physique) who had acquired the appropriate sex differentiated skills through such groups and assigning them as "spouses" stabilized mating relationships. It also equalized the distribution of mating opportunities among males, irrespective of whether they were large, small, or of medium height and weight. Nearly every skilled man was of use in the mate Exchange networks. The ongoing distribution of diversified resources through these networks added significantly to everyone's food supply, and thus effectively equalized the chances of reproductive success for women with different physiques and nutritional needs. The reduction of sexual dimorphism in human populations followed. The emergence of different tasks for women and men, and presumably of gender roles with differentiated behaviors, ironically set the stage for a decrease in physical sex differences.

EPILOGUE

Physical sex differences are often regarded as the foundation on which the sexual division of labor rests. In the biosocial model outlined above, I argue that the evidence suggests that the institutionalization of the sexual division of labor created conditions that reduced physical sex diffferences. The model also proposes that production for distribution is fundamental to the human condition. It says that production not only preceded the sexual division of labor, but also preceded incest taboos and marriage and kinship systems. The model, therefore, departs from structuralist views that these institutions are the benchmarks of human society and define it. The model differs from the Levi-Straussian model espoused by most structuralists in another way as well. Levi-Stauss sees the Exchange of women by men as a first step in the process of "culturalization", but I argue here as elsewhere that individuals of both

sexes were moved from one group to another to regularize Exchange.(47) Thus, I do not go along with the structuralist argument that women were subordinated to men as soon as "basic" cultural institutions emerged.

It is a manifestly political model. Clearly, the notion that socially transmitted innovations were crucial to the early survival of the human line has implications for our situation today when socially transmitted innovations threaten our species and all species. This model argues that innovations in social structure, not just innovations in technology, affect evolutionary events. Thus it reflects my belief that political action will play a large part in determining our future as biological and social beings.

NOTES

(1) Richard Potts, "Behavioral Reinterpretations of Lower Pleistocene Sites from Olduvai," paper presented at the annual meetings of the American Anthropological Association, December 1982.

(2) Judith Brown, "A Note on the Division of Labor by Sex," American Anthropologist 72 (1970): 1073-1078; Bernard Campbell, Humankind Emerging (Boston: Little, Brown, 1976); Euclid D. Smith, "Comment on 'Variations in Subsistence Activities of Female and Male Pongids' by B. Galdikas and G. Teleki," Current Anthropology 22 (1981): 252-253.

(3) Jules De Raedt, "Comment on 'A Marxist Reappraisal of the Matriarchate' by C. Fluehr-Lobban," Current Anthropology 20 (1979): 349-350.

(4) See, for instance, Birute M.F. Galdikas and Geza Teleki, "Variations in Subsistence Activities of Female and Male Pongids: New Perspectives on the Origins of Hominid Labor Division," Current Anthropology 22 (1981): 241-247.

(5) Lila Leibowitz, Females, Males, Families: A Biosocial Approach (No. Scituate, MA: Duxbury Press, 1978); Toshisada Nishida, "Comment on 'Variations in Subsistence Activities of Female and Male Pongids' by B. Galdikas and G. Teleki," Current Anthropology 22 (1981): 251; Janet Siskind, "Kinship and Mode of Production," American Anthropologist 80 (1978): 860-872.

(6) Galdikas and Teleki, "Variations in Subsistence Activities"; G. Teleki, "The Omnivorous Chimpanzee," Scientific American 228 (1973): 32-42.

(7) S.M. Hladik, "Comment on 'Variations in Subsistence Activities' by B. Galdikas and G. Teleki," Current Anthropology 22 (1981): 249-250; Yukimaru Sugiyama, "Comment on 'Variations in Subsistence Activities' by B. Galdikas and G. Teleki," ibid.: 253.

(8) See photograph in Teleki, "The Omnivorous Chimpanzee," p. 40.

(9) J.B. Silk, "Patterns of Food Sharing Among Mother and Infant Chimpanzees at Gombe National Park, Tanzania," Folia Primatologica 29 (1978): 129-141.

(10) Jane van Lawick Goodall, "The Behaviour of Free-Living Chimpanzees in the Gombe Stream Reserve," Animal Behaviour Monographs 1 (1968): 165-311; Thelma Rowell, Social Behavior of Monkeys (Harmondsworth: Penguin, 1972).

(11) Evelyn Reed, Woman's Evolution (New York: Pathfinder, 1975); Sally Slocum, "Woman the Gatherer: Male Bias in Anthropology," in Rayna R. Reiter, ed., Toward an Anthropology of Women (New York: Monthly Review Press, 1975); Nancy M. Tanner and Adrienne L. Zihlman, "Women in Evolution. I. Innovation and Selection in Human Origins," Signs 1 (1976): 585-608.

(12) Nishida, "Comment on 'Variations in Subsistence Activities,' by Galdikas and Teleki."

(13) Donald C. Johanson and Timothy D. White, "A Systematic Assessment of Early African Hominids," Science 203 (1979): 321-330; Richard Leakey, "New Evidence for the Evolution of Man," Social Biology 19 (1972): 99-114.

(14) Milford H. Wolpoff, Paleoanthropology (New York: Alfred A. Knopf, 1980).

(15) Jane van Lawick Goodall, "The Behaviour of Free-Living Chimpanzees."

(16) Yukimaru Sugiyama, "Social Organization of Chimpanzees in the Budongo Forest, Uganda," Primates 9 (1968): 225-258.

(17) Thelma Rowell, Social Behavior of Monkeys.

(18) Ibid., p. 163.

(19) Gary L. Shapiro, "Reports from the Field: Orangutan Research and Conservation Project," L.S.B. Leakey Foundation News 18 (1980): 7-8.

(20) John MacKinnon, In Search of the Red Ape (New York: Ballantine, 1974).

(21) Frances D. Burton, "The Integration of Biology and Behavior in the Socialization of Macaca Sylvana of Gibraltar," in Frank E. Poirier, ed., Primate Socialization (New York: Random House, 1972), pp. 29-62; M.H. MacRoberts, "The Social Organization of Barbary Apes (Macaca Sylvana) on Gibraltar," Am. J. Phys. Anthropol. 33 (1970): 83-100.

(22) Gray Mitchell, William K. Redican and Judy Comber, "Lesson From A Primate: Males Can Raise Babies," Psychology Today 7 (May 1974): 63-68.

(23) E.D. Starin, "Monkey Moves," Natural History 90, no. 9 (September 1981): 36-44.

(24) Tim Clutton-Brock, "The Red Deer of Rhum," Natural History 91, no. 11 (November 1982); 42-47.

(25) L.S.B. Leakey and J.S. Prost, Adam or Ape (Cambridge, MA: Schenkman, 1971).

(26) A. Mann, "Paleodemographic Aspects of the South African Australopithecines," University of Pennsylvania Publications in Anthropology, no. 1 (1975).

(27) Kelton R. McKinley, "Survivorship in Gracile and Robust Australopithecines: Demographic Comparison and a Prepared Birth Model," Am. J. Phys. Anthropol. 34 (1971): 417-426.

(28) Phyllis C. Lee, "Socialization of Immature Vervet Monkeys," The L.S.B. Leakey Foundation News 23 (1982): 7.

(29) Nancy Makepeace Tanner, On Becoming Human (New York: Cambridge University Press, 1981).

(30) Ibid., p. 220.

(31) Rose E. Frisch, "Nutrition, Fatness and Fertility: The Effect of Food Intake on Reproductive Ability," in W. Henry Mosely, ed., Nutrition and Human Reproduction (New York: Plenum Press, 1978), pp. 91-122; Rose E. Frisch, "Fatness, Puberty, and Fertility," Natural History 89, no. 10 (October 1980): 16-27; Rose E. Frisch and Janet W. McArthur, "Menstrual Cycles: Fatness as a Determinant of Minimum Weight for Height Necessary for their Maintenance or Onset," Science 185 (1974): 949-951; Rose E. Frisch, Grace Wyshak, and Larry Vincent, "Delayed Menarche and Amenorrhea in Ballet Dancers," New England Journal of Medicine 303 (1980): 17-19.

(32) Frisch, "Fatness, Puberty, and Fertility," p. 20.

(33) Donald C. Johanson and Maitland A. Edey, Lucy: The Beginnings of Mankind (New York: Simon and Schuster, 1981); Science News of the Week, Oldest Tool Kit Yet, Science News 119 (1981): 83-84.

(34) J. David Ligon and Sandra H. Ligon, "The Cooperative Breeding Behavior of the Green Woodhoopoe," Scientific American 247, no. 1 (July 1982): 126-135.

(35) Claude Levi-Strauss, The Elementary Structures of Kinship (Boston: Beacon Press, 1969).

(36) Emile Durkheim, The Division of Labor in Society (New York: Free Press of Glencoe-MacMillan Co., 1974), pp. 56 ff.

(37) Talcott Parsons, "The Incest Taboo in Relation to Social Structure," in R.L. Coser, ed., The Family, Its Structure and Functions (New York: St. Martin's Press, 1964), pp. 48-69; Talcott Parsons, Societies: Evolutionary and Comparative Perspectives (New York: Free Press of Glencoe, 1966).

(38) Nancy Howell, Demography of the Dobe Area !Kung (New York: Academic Press, 1979); Gina Kolata, "!Kung Hunter-Gatherers: Feminism, Diet, and Birth Control," Science 185 (1974): 932-934.

(39) David Frayer, "Body Size, Weapon Use, and Natural Selection in the European Upper Paleolithic and Mesolithic," American Anthropologist 83 (1981): 57-73.

(40) Alice M. Brues, "The Spearman and the Archer," American Anthropologist 61 (1959): 457-469; Frayer, "Body Size, Weapon Use, and Natural Selection."

(41) C. Loring Brace, "Sexual Dimorphism in Human Evolution," in C.L. Brace and J. Metress, eds., Man in Evolutionary Perspective (New York: Wiley, 1973), pp. 238-254; Johanson and Edey, Lucy: The Beginnings of Mankind; Wolpoff, Paleoanthropology.

(42) Hladik, "Comment on 'Variations in Subsistence Activities.'"

(43) Nishida, "Comment on 'Variations in Subsistence Activities.'"

(44) Catherine Perles, "Hearth and Home in the Old Stone Age," Natural History 90, no. 10 (October 1981): 38-41.

(45) Chester S. Chard, Man in Prehistory (New York: McGraw Hill, 1975).

(46) Frayer, "Body Size, Weapon Use, and Natural Selection"; Wolpoff, Paleoanthropology.

(47) Lila Leibowitz, "Founding Families," Journal of Theoretical Biology 21 (1968): 153-162; Lila Leibowitz, "Perspective on the Evolution of Sex Differences," in Rayna Reiter, ed. Toward an Anthropology of Women (New York: Monthly Review Press, 1975), pp. 20-35; Leibowitz, Females, Males, Families.